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Abstract

In this article we investigate the electoral effects of a prominent Dutch Voter Advice Application site (www.kieskompas.nl). Our research design combines factual data on the recommendations received by users from the site's log files with users' responses to pre-advice and post-election survey items. We find that the effects of online recommendations on vote choice depend on the congruence of the recommended party with the users' pre-existing preferences. When the site recommended a party that was being seriously contemplated by the user, the user was demonstrably more likely to go on to vote for the recommended party. We find that this effect was not visible among voters who

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indicated that they were only seriously considering one party for their vote choice when they visited the site.

Keywords

statistical analysis, The Netherlands, vote choice, voter advice applications, voters/citizens

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Introduction

In this article we seek to investigate the effects of a Voter Advice Application (hereafter, VAA) website on the vote choices made by a subsample of its users. The idea behind a VAA website is that site users respond to several questions on political issues and then receive personalized advice as to how their issue preferences compare with the policy stances taken by parties/candidates competing in an upcoming election. Such sites frequently attract high numbers of users during national election campaigns in a growing number¹ of established democracies (Walgrave et al., 2008). VAAs have also been deployed for elections to the European Parliament; the 2009 'EU Profiler' site, which was deployed across 30 European countries, generated over 900,000 pieces of unique advice (Treichsel and Mair, 2009). More recently, VAA sites have been created for elections in emerging democracies such as Tunisia, Morocco and Egypt.

Apart from being widely consumed, VAA sites are often controversial, attracting criticism from media outlets, political actors and many academic political scientists. Part of the controversy of such sites derives from the lack of any widely accepted, standardized methodology for voter-party comparison in terms of both issue selection and overall similarity metrics. Absent such common standards, VAA designers must make methodological choices with regard to both their measurement of party policy platforms and of party-user issue correspondence (Krouwel and Fiers, 2008; Krouwel and Wall, forthcoming; Treschel and Mair, 2009; Wall et al., 2009); individualized analyses resulting from these methodological choices are provided to members of the public as a means of simplifying policy competition in multiparty systems. Farrell and Schmitt-Beck (2008) argue that VAA sites are instances of a broader trend in the postmodern campaigning environment: the growing presence of non-party actors who participate in and often shape electoral campaigns without themselves running for office. VAA 'campaigns', however, differ from those of many other non-party actors because they produce voting advice that varies from individual to individual, and they claim that their recommendations are specifically tailored to each individual's policy preferences. This aspect of VAAs means that their effects in terms of party preferences and voting behaviour must be studied at the individual level if they are to be adequately understood.

The substantive political importance of VAA sites depends on the extent to which they influence political behaviour, in particular party choice. The objective of this study is to present new evidence on whether such websites influence the vote

choices made by their users. We can only hope to reliably address the question of VAA influence on vote choice by looking at the observable relationship between the recommendations that users receive when they visit the site and their subsequent vote choices. However, this poses a methodological challenge: if VAA sites are expressly designed to identify the party that is ideologically ‘closest’ to the user, how then can we distinguish instances of a site exerting ‘influence’ from instances where a site has correctly identified the user’s voting intentions?

Our research design addresses this challenge by taking advantage of the substantial benefits that the Internet offers to social science researchers in terms of data collection. We employ data generated by users of the *kieskompas.nl* site during the 2010 Dutch legislative election campaign. The *kieskompas.nl* site was the second most widely consumed VAA in the campaign in generating over 800,000 separate vote recommendations during the campaign period. Records of the experiences of *kieskompas.nl* users were captured in site ‘log-files’ which preserve each user’s responses to the VAA survey items and the advice that they received as a dataset. As we asked users to provide us with their email address, we were able to combine these log files with the responses of site users to pre-advice and post-election surveys, an approach that grants us leverage over the temporal ordering of users’ experience online and subsequent behaviour.

The Dutch 2010 legislative election is a particularly apposite locus for a study of VAA effects of vote choice, given that the VAA concept originated in The Netherlands, where there is now a (comparatively) long history of VAA sites achieving significant media coverage and high user volumes during legislative election campaigns (Walgrave et al., 2008). Furthermore, comparatively high levels of party system fragmentation (Dalton, 2000; Krouwel, forthcoming; Van der Brug and Pellikaan, 2003) mean that Dutch voters have to choose from among a large number of parties. In such a chaotic informational context, a clear, personalized vote recommendation, which is based on their issue preferences, may be more appealing to voters than it would be in a more stable, less fragmented system. In short, the 2010 Dutch elections provide optimal conditions for a VAA website to be politically influential.

Our concern in this article is to investigate whether there is empirical evidence of a single VAA’s output exerting a causal effect on its users’ vote choice in a national legislative election, and to outline a methodological approach to studying this question that could be exported to the future study of VAA site effects. Furthermore, we are interested in exploring the nature of the influence exercised by the site over its users – in the following sections, we discuss the difficulty of measuring VAA ‘effects’ and summarize the existing literature on this topic. We also locate the nature of VAA website influence within the literature of media and campaign effects. We then present and empirically examine arguments as to the nature of the influence that VAA sites exert on their users. We conclude by investigating whether VAA advice was more significant for uncertain voters – and find evidence that this was the case. While our approach improves on the existing literature in terms of isolating the effect of VAA advice, we acknowledge the fact that only users of one VAA are analysed and that we do not dispose of a representative sample of the Dutch population limit the generalizability of our findings. We conclude with a discussion of future avenues of research for furthering our understanding of VAA effects.

Estimating the effects of VAA websites on vote choice

VAA sites are a comparatively novel political phenomenon and consequently political scientists have only recently started to investigate how they function, what sort of advice they produce,² and who visits them³ (Fivaz and Schwarz, 2007; Hooghe and Teepe, 2007; Fivaz and Jeitziner, 2005; Walgrave et al., 2009; Wall et al., 2009). Ladner et al. (2010) have identified a 'second wave' of VAA studies investigating VAAs by asking the same fundamental questions of them that political scientists have asked of previous campaign innovations: 'What are their effects on voting behaviour?', and 'How do they relate to the realization of democracy writ large?'. We focus here on studies that have investigated the influence of VAA use on vote *choice*, that is, the specific party/candidate that individuals vote for, rather than their influence on turnout or broad political engagement.⁴

A focus on the cognitive processes that operate when individuals make decisions with little information has led several analysts to conclude that voters employ 'heuristics' or 'cognitive shortcuts' to arrive at decisions that are similar to those that they would have made had they investigated the issue in depth (Lupia, 1994; Lupia and McCubbins, 1998). Such shortcuts allow voters to make preference-maximizing political choices without the excessive cost in time and energy that complete knowledge demands.⁵ Walgrave et al. (2008) argue that the potential for VAAs to influence their users' political behaviour lies in their informative effect. VAAs purport to substantially reduce the cognitive cost needed for a voter to engage in informed issue voting, which can be prohibitively costly due to the time and effort required. This cognitive price tag is particularly exorbitant in highly fragmented, multidimensional party systems such as that in The Netherlands. Walgrave et al. conclude that 'the fact that VAAs seem to be popular, especially in countries with a large and fragmented, and thus complicated, party system, indicates that information is key' (p. 43).

VAA sites are, fundamentally, heuristic-generating instruments. The heuristics that they create for their users are most analogous to endorsements (with each individual given a specific party endorsement by the site), but they also have an element of ideological heuristic content (because voters are given a simplifying indication of their overall issue-based similarity to the competing parties). The fact that the output of the site is presented as reflecting the user's own opinions, rather than the opinions of any particular group or party, gives the site endorsement/recommendation a powerful persuasive element. Furthermore, as demonstrated in Figure 1, the advice is typically easy to understand: the 'closest' party, according to the VAA measurement procedure, is clearly identified for each user. Thus a VAA's advice provides a sense of issue-based personalization combined with clear presentation – making it potentially very persuasive. This line of reasoning leads us to anticipate that at least some voters will be swayed by the vote recommendation provided by their visit to a VAA site. Specifically, we develop the following hypothesis:

Hypothesis 1: Receiving VAA advice to vote for a party should lead VAA users to be more likely to vote for that party, *ceteris paribus*.

We note here that *kieskompas.nl* differs considerably in terms of methodology and output from The Netherlands' most popular site: *stemwijzer.nl* (Krouwel and Fiers,



Figure 1. Advice screen of Kieskompas.nl 2010 Dutch legislative elections (closest-party advice circled).

2008). We therefore cannot generalize with certainty from the kieskompas.nl site's effects to an overall estimate of the effect of VAAs on their users. It is possible that VAA effects may be influenced by the extent to which a given site is widely known and considered to be credible by its users; the design of the 'result' screen; and country or election-specific factors.

The classic 'minimal effects' counter-argument to the contention that campaign information can change voters' preferences holds that people do not absorb political information in an undifferentiated manner, nor do they easily change their partisan preferences on the basis of new information. Bartels (1993) argues that 'the apparent effects [of campaign experiences] will often be modest in magnitude, not because the media cannot be persuasive but because opinions at the beginning of a typical campaign are already strongly held and because media messages during the course of a campaign

are, in any case, only occasionally inconsistent with those pre-existing opinions' (p. 275). A rich tradition in public opinion and voting behaviour research going back to the work of Berelson et al. (1954) has argued that political campaigns typically serve to reinforce voter's partisan predispositions, rather than 'persuading' large swathes of voters to change their opinions (Ansolabehere et al., 2008; Campbell, 1960).

In contrast to the 'minimal effects' model, Johnston et al. (1992) have championed the idea that the campaign can change people's minds or the dimension of choice on which they prioritize their decision. Brady et al. (2006) argue that campaign studies should move beyond the dichotomous persuasion/no persuasion operationalization that characterizes the 'minimal effects' account of campaign effects. Rather, campaign effects are better understood as a set of continuous variables, which depend on an array of circumstantial factors, as well as the predispositions of the voters involved in a given election. According to this argument, campaign events and issues offer strategic, dynamic opportunities for a new coalition or the reconstitution of long-term forces. In multiparty races, such as in The Netherlands, when there is more than one potential dimension of conflict, there is thus the possibility for persuasive messages to lead to vote change.

Iyengar and Simon (2000: 158–161) contend that the traditional 'hypodermic' model of campaign effects fails to capture this aspect of voter cognition, and they prefer the more recent 'resonance model', which views campaign messages as interacting with the prior predispositions of voters. One of the key insights of the resonance model is that 'messages that are counter-attitudinal will be actively resisted, whereas that are consonant will be accepted' (ibid., p. 159). This approach chimes with prior literature on media effects which holds that the influence of persuasive messages should be mediated by the person's likelihood of receiving a persuasive message and accepting it (McGuire, 1986; Zaller, 1992). This approach leads us to expect that political information is differentially processed according to each individual's partisan and value-based predispositions, meaning that individuals tend to absorb information that is congruent with their predispositions more frequently and readily than they absorb ideologically or politically incongruent information (Zaller, 1992).

We would therefore be surprised if VAA users uncritically followed the advice given to them online, no matter how much it simplifies political decision-making, if that advice runs radically contrary to their prior political predispositions. In addition, VAA recommendations are just one of a number of competing information sources to which a voter may be exposed during a campaign. When such cues provide conflicting advice, it is the voter herself who must decide which information to accept (Lupia and McCubbins, 1998: 40). Zaller's (1992) Resistance Axiom, the insights of the communications, political psychology and electoral behaviour literature, and, indeed, common sense would therefore lead us to anticipate that users will resist integrating highly incongruent information into their political considerations far more than they will resist information that chimes with their existing preferences. As such, we consider it unlikely that users will vote for a party they had previously completely ruled out just because of the advice of a VAA site. We therefore argue that the most likely political effect of a VAA recommendation should be to increase one's inclination to vote for the recommended party, *when one is already seriously contemplating voting for that party*. When the user has deemed the recommended party electorally

off-limits, we do not expect the advice to influence their vote choice. As such, we argue that the impact of the information received by users on VAA sites will be largely confirmatory, rather than persuasive. This leads us to specify a second hypothesis:

Hypothesis 2: VAA recommendations are most influential when the user is already seriously considering the recommended party as a potential vote choice, and have little or no influence when the user is not considering the recommended party as a potential vote choice.

A corollary to the above hypothesis is that the effects of VAA advice may depend on the extent to which individuals are considering multiple parties. Empirical evidence indicates that a highly stable and predictable ‘pillarized’ system of partisan loyalties, which structured Dutch electoral politics up to the early 1960s, has been replaced with considerably more volatile patterns of partisan sentiment and of voting behaviour (Andeweg and Irwin, 2002: 89–92). Many Dutch voters now appear to decide on which party to support during the course of the campaign (Dalton et al., 2000: 48; Irwin and Van Holsteyn, 2008). However, loyalists of a given party are considerably less likely to be influenced by campaign events. As such, we anticipate that:

Hypothesis 3: VAA advice has little or no influence on vote choice when the user is only seriously considering one political party.

In terms of methodology, previous studies investigating the effects of VAAs on vote choice have employed post-election surveys of users (sometimes as part of larger surveys which also include non-users), where respondents provided their own subjective evaluations of whether their vote choice was influenced by their visit to a VAA site (Aarts and van der Kolk, 2007; Carlson and Strandberg, 2005; Ladner et al., 2010; Marschall and Schmidt, 2010; Walgrave et al., 2008). These surveys have varied dramatically in their estimates of the importance attributed by users to VAA sites. The specific questions used to elicit estimates of site influence vary across studies, which may help to explain some of the observed disparity of extant findings. Estimates of percentages of users who feel that their eventual decision was influenced by their visit to a VAA vary from a low of 6 percent (Marschall, 2005) to a high of 67 percent (Lander et al., 2010).

However, subjective evaluations of the extent to which a website was influential, while informative, are regrettably not reliable sources of information as to the actual influence that the website may have exercised. The agenda-setting, priming and framing literatures in communication and media studies, for instance, have uncovered the existence of politically influential behaviours that rarely register in the consciousness of voters (Scheufele and Tewksbury, 2007). Several studies have therefore used panel surveys to compare the behaviour of users to non-users of VAAs in terms of their proclivity to ‘switch’ their first preference vote choice during the campaign and/or to ‘switch’ party support compared to their previous vote (Ladner et al., 2010; Ruusu-virta and Rosema, 2009; Walgrave et al., 2008). Walgrave et al. (2008) find little support for the contention that VAA users were any more likely to switch vote intentions than non-users during the campaign, whereas Ladner et al. (2010) and Ruusu-virta and Rosema (2009) both conclude that VAA users are significantly more likely to switch than non-users.⁶

In spite of these advances, research designs that seek to infer an estimate of the effects of VAA sites on voting behaviour using such data face major difficulties. The first problem is one of causal endogeneity. VAA sites can attract high numbers of unaligned or wavering voters (Ladner et al., 2010). Analyses of whether users of VAA sites exhibit higher in-campaign or between-election volatility than non-users may therefore tell us more about the type of audiences that VAAs attract than about the effects that they may be said to exert. Similarly, if a user receives disconfirming advice, this may be because changes in either the user's opinions or the party's position mean that there are objective reasons why that user should decide to switch parties during the campaign. Again, it is difficult to distinguish instances of a VAA site exerting an influence from those where the site identifies a change in preferences that has already taken place (Ruusuvirta and Rosema, 2009).

A further problem for such analyses is that a visit to a VAA site is not a mass-mediated 'campaign event' in the typical sense of the phrase, because the informational output of a VAA site (i.e. the 'vote advice') is not identical for each user. As such, even when researchers incorporate panel designs into their studies of VAA users, the dichotomous variable: 'used/didn't use a VAA' is a rather clumsy proxy for each user's experience. Unfortunately, this is not a problem that can be resolved by incorporating a survey item asking users to recall the specifics of the advice that they received. Using the data collected for this study (see data and methods section below), we can compare users' recall of the vote advice that they received with objective data from their log files. On the basis of these data, we find that user recall of advice received is unreliable:⁷ 53.8 percent of users recalled receiving advice that was different from the advice recorded in their log files.

Furthermore, it appears that user recall is consistently biased: respondents who did not correctly recall the advice recorded in their log files were far more likely to 'recall' the party that they voted for than any other party. Of the over 2,000 incorrect recalls, with 11 parties to choose from, 749 individuals (34.4 percent of users who incorrectly recalled the advice received) stated that they had been advised to vote for the party which they had voted for in the election. This observed bias means that using respondent recall to measure VAA advice risks inflating estimates of the extent to which VAA users 'followed' the advice that they received. Consequently, a recall-based research design may lead to significant overstatements of the causal importance attributable to VAA site advice.

Researchers thus face significant difficulties in estimating whether VAA advice has any discernible influence on the vote choices of site users. We argue that the approach outlined in this article overcomes several of these problems. The use of log files gives us objective data on the experience of each site user, while the combination of pre- and post-advice survey items with log file data provides greater insight than previous studies into the casual process that connects voting advice received online to actual voting behaviour.

Analysis

Methods and data

Our research design is as follows: each user of kieskompas.nl between the site launch date (27 April 2010) and the day of the election (9 June 2010) created a 'log file', which

keeps a record of the details of their visit to the site. Immediately before they received their recommendation (i.e. the party that was deemed ‘closest’ to them by the VAA), kieskompas.nl users were asked to estimate the likelihood that they would ever vote for each of the main parties competing in the election. By offering this question before the final result is given, the estimated propensity to vote for each party is not ‘contaminated’ by the advice of the VAA. Van der Eijk et al. (2006) demonstrate that this ‘propensity to vote’ (PTV) survey item is a useful way to operationalize the electoral utility that a voter attaches to each party competing for their votes at the election. We use this variable as the crucial control that allows us to isolate the specific effects of advice received on members of our sample. This measure captures the electoral utility site users attached to each party immediately prior to receiving their VAA output, allowing us to deploy a relatively straightforward model in our analysis. Responses to this item were constrained to natural numbers ranging from 0 to 10, where 0 means ‘not at all probable’ and 10 means ‘very probable’ (all 11 parties were evaluated on this scale by the respondent). Users’ stated probabilities to vote (hereafter, PTVs) for each party were recorded, along with the specific advice that they received, in their log files.

The second stage of our data collection relied on the site’s ‘extra survey’ feature. This was an opt-in section of the site where users could register their email addresses and indicate their permission to be contacted for subsequent surveys. Of the over 800,000 unique visits generated by the site, over 8,000 users left emails and indicated permission to be contacted. The email addresses of users were recorded in their log files, in the same row of data that contained the other details of their site visit (including their PTVs for all parties and the advice that they received). The authors sent a post-election survey to these users, which included an item on how they had voted, and items asking respondents for their perceptions of the influence that visiting kieskompas.nl had on their vote choices.⁸ The survey elicited a response rate of just over 52 percent, generating an *N* of 4,257 respondents.

It is important to point out that this data collection procedure means that the sample is not representative of the Dutch population at large, and therefore we cannot extrapolate from our findings to the overall population. Table 1 below lists the vote choices of our respondents. It is clear that supporters of ‘left’ and ‘progressive’ parties are significantly over-represented relative to their national vote-share in our data, while ‘right’ and ‘conservative’ parties are under-represented, particularly Geert Wilder’s PVV. Furthermore, there is a possibility that the ‘opt in’ nature of the study means that we may have sampled users who are particularly interested in and/or sympathetic to VAA sites, and hence are more likely to have been affected by their experiences online than the typical user.

As such, the generalizability of our findings is highly limited. Yet, the major advantage of our research design is that it allows us to probe for the existence of a causal effect by capturing users’ pre-advice likelihood to vote for each party, and then controlling for this property when analysing the impact of advice on their reported voting behaviour. We merged users’ responses to the post-election survey with their individual log file entries. This approach meant that we captured the three vital elements required for constructing a plausible individual-level analysis of the effects of a VAA on user vote choice: (1) each user’s pre-advice party electoral utilities, (2) an objective measure of the advice received by each user, and (3) recall data on the vote

Table 1. Reported vote choice of panel respondents versus results of 2010 Dutch legislative elections

Party	Result 2010%	Sample %	% Difference
People's Party for Freedom and Democracy (VVD)	20.5	16.5	-4
Labour Party (PvdA)	19.6	22.1	+2.5
Party for Freedom (PVV)	15.5	9	-6.5
Christian Democratic Appeal (CDA)	13.6	6.5	-7.1
Socialist Party (SP)	9.8	8.6	-1.2
Democrats 66 (D66)	7	13.7	+6.7
Green Left (GL)	6.7	16.8	+10.1
Christian Union (CU)	3.2	3.9	+0.7
Reformed Political Party (SGP)	1.7	0.7	-1
Party for Animals (PvdD)	1.3	1.4	+0.1
Proud of Netherlands (ToN)	0.6	0.2	-0.4
Others	0.5	0.6	0.1

choice of each user. Thus, while limited in terms of representativeness, these data allow us to isolate the causal effects of the VAA advice received by members of our sample, which represents a significant step forward compared to the extant literature on the topic reviewed above.

Subjective evaluations of VAA effects

We begin by looking at the evaluations made by users themselves of the influence that their visit to kieskompas.nl exerted on their vote choices. H1 would lead us to anticipate that a large proportion of users should consider that the site exerted some sort of influence on their vote choice, while H2 suggests that this influence should primarily be one of preference confirmation (rather than preference conversion). H2 also implies that those who received advice that was congruent with their partisan predispositions should attribute greater influence to their visit to the site than those who received incongruent advice.

Table 2 presents the response frequencies for a categorical survey item, which asked users to characterize what, if any, effect kieskompas.nl had on their vote choice. We can see that while the second largest group, at 29 percent, stated that their visit had 'no effect', 71 percent of users choose options indicating that they consciously experienced some form of VAA 'effect'. Just over 30 percent indicated that the experience was one of preference confirmation, while 26.1 percent stated that their visit presented them with previously unconsidered options. A smaller number indicated that the visit directly shaped their vote choice – either by helping them to choose among several parties that they were considering (9.2 percent) or, for a very small number of respondents, by leading them to vote for a previously unconsidered party (1.1 percent).

Figure 2 describe users' perceptions of the strength of the kieskompas.nl effect on a 0–10 scale, where 0 is 'no effect' and 10 indicates 'a very strong effect'. Figure 2 separates users who were advised to vote for a party which they had given a PTV of 6 or higher⁹ (designated 'congruent' users) from those who were advised to vote for

Table 2. Responses of survey group to the question: ‘Which of the following best describes the influence that visiting kieskompas.nl had on your vote choice?’

Type of influence	Frequency	Percent
Confirmed my preferences	1,195	30.2
No effect	1,145	29.0
Showed me other options, but didn’t change my mind	1,032	26.1
Helped to choose among several parties	365	9.2
Led me to vote for a party I had not previously considered	45	1.1
Other	171	4.3
Total	3,953	100

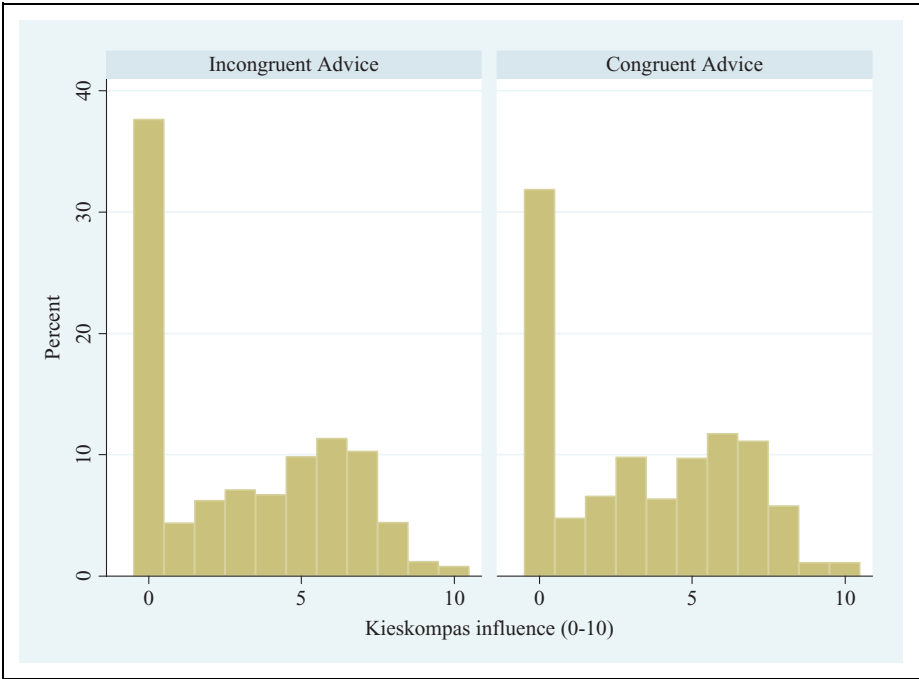


Figure 2. Response frequencies of ‘congruent’ versus ‘incongruent’ user groups to the question: ‘How would you rate the impact of the advice received on kieskompas.nl on your vote on a scale from 0–10, where 0 is no effect and 10 is a very strong effect?’

a party to which they had given a PTV of 5 or lower (designated ‘incongruent’ users). Overall, ‘0’, which was the response of 35.3 percent of users, is the largest category in terms of frequency. Nonetheless, a clear majority of respondents estimated that the site had influenced their vote to some extent. Very few voters attributed the highest level of influence to their visit to the site: less than 1 percent scored the influence of their visit as a ‘10’.

Table 3. Was VAA advice ‘followed’? Congruent versus non-congruent advice (column percentages in parentheses)

Did the respondent vote for the party recommended by kieskompas.nl?	Did the respondent rate their likelihood to vote for the advised party at 6 or higher out of 10?		
	No	Yes	Total
No	2,456 (94.0%)	531 (36.7%)	2,987 (73.5%)
Yes	157 (6.0%)	918 (63.3%)	1,075 (26.5%)
Total			

Looking at the difference between the ‘congruent’ and ‘incongruent’ user groups, we can see in Figure 2 that these groups are more alike than we may have expected under H2. While the ‘incongruent’ group’s average impact evaluation is significantly smaller than the ‘congruent’ group’s average (with 99 percent confidence, using a one-tailed *t*-test), these differences are not very pronounced: the ‘incongruent’ group average is 3.1, while the ‘congruent’ group average is 3.4. Overall, then, our descriptive analysis provides reasonable support for H1 and rather less emphatic support for H2.

Inferential analysis

A logical starting point for our inferential analysis is to look at how many respondents voted for the party that kieskompas.nl recommended to them. Among all survey respondents, 26.5 percent voted for the party recommended. The obvious implication is that 73.5 percent did not. Of course, these raw numbers tell us little about whether the site exercised any discernible influence of user vote choice. We therefore cannot say that 26.5 percent of the respondents ‘followed’ the advice that they received online. Taken in isolation, these figures could simply mean that the site correctly identified the vote intentions of 26.5 percent of its users on the basis of their policy positions.

The crucial element for understanding the nature of the influence exerted by the kieskompas.nl site on its users is the interplay between users’ pre-existing preferences and the advice that the site generates. A simple cross tabulation, provided in Table 3, tells much of the story that we develop in more detail in this analysis. In Table 3, we give the percentages of voters who voted for the party recommended by kieskompas.nl for two groups. As with Figure 2, we divide respondents according to the relationship between the advice given and each user’s pre-advice political preferences, separating those who received ‘congruent’ voting advice (i.e. advice to vote for a party to whom they had given a PTV of 6 or higher) from those who did not. Table 3 shows that only 157 survey respondents (just under 4 percent of the entire sample) voted for the party recommended as ‘closest’ to them by the site when they had estimated their pre-advice likelihood of ever voting for the advised party at 5 or lower on the 0–10 PTV scale.

The next step in our analysis requires that we restructure our data;¹⁰ representing our variables of interest over 40,524 observations, where each observation is a user-party dyad (i.e. 3,684¹¹ respondents multiplied by 11 evaluated parties). This restructuring

Table 4. Distributions of ‘PTV’ for recommended versus not recommended voter-party dyads

PTV	Recommended dyads	Not recommended dyads
10	14.1% (521)	3.1% (1,140)
9	9.9% (364)	3.8% (1,399)
8	11.7% (432)	6.5% (2,383)
7	9.5% (351)	7.8% (2,877)
6	8.7% (320)	8.0% (2,957)
5	8.6% (316)	7.9% (2,906)
4	5.2% (192)	5.7% (2,105)
3	4.5% (167)	5.6% (2,067)
2	4.7% (174)	6.15 (2,253)
1	4.3% (157)	6.8% (2,512)
0	18.7% (690)	38.7% (14,241)
Total	100% (3,684)	100% (36,840)
Average PTV	5.3	3.2

allows us to split voter-party dyads into two groups: ‘recommended’ dyads (where the party in the dyad was recommended to the user by kieskompas.nl) and ‘not recommended’ dyads. Each voter can thus be represented as 1 ‘recommended’ voter-party dyad, and 10 ‘not recommended’ voter party dyads. Overall, this means that we compare a group of 3,684 ‘recommended’ voter-party dyads to a group of 36,840 ‘not recommended’ voter-party dyads. ‘Recommended’ is a dichotomous variable that is coded ‘1’ when kieskompas.nl recommended the party in a voter-party dyad and ‘0’ when it did not. Each dyad also has a value for ‘PTV’, capturing the respondent’s self-reported pre-advice likelihood of ever voting for the party in the user-party dyad, taken before the site’s recommendation was issued. Thirdly, each dyad has a value for ‘Vote’, which is dichotomous and is coded ‘1’ when a respondent reported voting for the party and ‘0’ when they did not. Our goal in collecting and transforming these data is to investigate the relationships between ‘Recommended’ and ‘Vote’, while holding ‘PTV’ constant.

A first step in our analysis looks at the distribution of PTV scores for voter-party dyads in the recommended and not recommended groups. These distributions are shown in Table 4. On average, the recommended dyads have a higher PTV than the not recommended dyads. This is what one would anticipate, given that the kieskompas.nl VAA sought to match users with ideologically ‘close’ parties in its recommendations. The average PTV value for recommended dyads is 5.3, while the average for not recommended dyads is 3.2, a difference which is statistically significant over our 40,524 observations with 99 percent confidence using a *t*-test. This finding means that we must hold PTV constant to isolate any causal effects that may be attributable to the VAA advice.

The empirical implications of H1 for these data are that user-party dyads where ‘Recommended’ equals ‘1’ should be more likely to be ‘Voted’ than dyads where ‘Recommended’ equals ‘0’, when PTV is held constant. H2 leads us to anticipate that the differences between the ‘recommended’ and ‘not recommended’ dyads should be most pronounced where high PTV values indicate that the advised party was being seriously

Table 5. Proportions of 'voted' user-party dyads for 'recommended' and 'not recommended' dyads for each value of PTV (*N* for each proportion in parentheses, statistically significant differences in boldface)

PTV	% 'voted' dyads recommended	% 'voted' dyads not recommended	% difference	Chi-squared test results
10	84.1% (438/521)	65.9% (751/1,140)	+ 18.2%	$\chi^2(1, N = 1,661) = 58.18, p = 0.00$
9	62.6% (228/364)	40.6% (568/1,399)	+ 22.0%	$\chi^2(1, N = 1,763) = 56.64, p = 0.00$
8	43.5% (188/432)	24.5% (584/2,383)	+ 19.0%	$\chi^2(1, N = 2,815) = 66.41, p = 0.00$
7	21.9% (77/351)	13.4% (385/2,877)	+ 8.5%	$\chi^2(1, N = 3,228) = 18.75, p = 0.00$
6	13.1% (42/320)	5.4% (159/2,95)	+ 7.7%	$\chi^2(1, N = 3,277) = 30.13, p = 0.00$
5	4.7% (15/316)	3.3% (96/2,906)	+1.4%	$\chi^2(1, N = 3,222) = 1.78, p = 0.18$
4	1.6% (3/192)	1.5% (32/2,105)	+0.1%	$\chi^2(1, N = 2,297) = 0.00, p = 0.96$
3	3.6% (6/167)	0.9% (18/2,067)	+ 2.7%	$\chi^2(1, N = 2,234) = 10.77, p = 0.001$
2	1.7% (3/174)	1.2% (26/2,253)	+0.5%	$\chi^2(1, N = 2,427) = 0.44, p = 0.51$
1	0.6% (1/157)	0.5% (13/2,512)	+0.1%	$\chi^2(1, N = 2,669) = 0.04, p = 0.84$
0	0% (0/690)	0.4% (51/14,241)	-0.4%	$\chi^2(1, N = 14,931) = 2.47, p = 0.12$

considered during the election campaign, and less pronounced among dyads with small PTV values.

In order to test whether these empirical implications are borne out, we segment the data according to the PTV of the user-party dyads. This computation allows us to compare 'recommended' versus 'not recommended' user-party dyads at each value of PTV. For each value of PTV, we report a Pearson's chi-squared statistic and associated *p*-values with 1 degree of freedom for the proposition that the proportions of 'voted' and 'not voted' dyads are identical for the groups of 'recommended' and 'not recommended' dyads. We take *p*-values of 0.05 or smaller as a cut-off point for considering the difference in proportions across groups statistically significant. Table 5 gives the results of this analysis. Figure 3 maps these proportions (and the differences between groups) for ease of visual interpretation.

We can see from Table 5 and Figure 3 that recommended parties are significantly more likely to become voted parties than not-recommended parties (confirming H1), and this effect is principally observed at PTVs of 6 or higher (confirming H2). The scale of the effect is largest at PTV values of 8, 9 and 10, where recommended user-party dyads are 'voted' dyads 18.2–22 percent more often than not recommended dyads. The VAA effect is smaller, but still statistically significant at PTVs of 6 and 7, where recommended dyads are voted 7.7 percent and 8.5 percent more often than not recommended dyads, respectively. For values of PTV lower than 6, only one category (3) shows any significant difference across groups, and the difference here is small, at 2.6 percent. For other low PTV values, there is no discernible difference between the recommended and not-recommended dyads in terms of their likelihood to be 'voted' dyads, meaning that we cannot identify any VAA 'effect' for these values of PTV.

These findings accord with our characterization of the effects of VAA recommendations on user vote choice in H1 and H2. We can see that VAA users rarely have

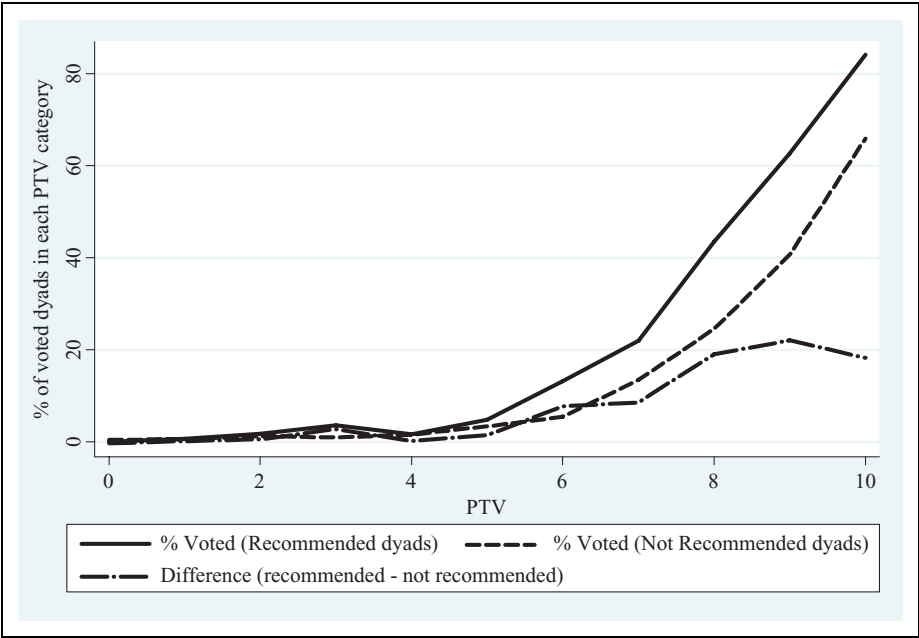


Figure 3. Line plot of proportions of ‘voted’ user-party dyads by whether party was ‘recommended’ or ‘not recommended’, and the difference between recommended and not recommended group proportions as PTV increases.

their prior preferences radically overturned due to getting a recommendation online, but it appears that a congruent recommendation can help to firm up a voter’s mind when they are already leaning towards the recommended party. However, when we isolate those users who were only contemplating a single party for their vote, which we do by separating voters who gave only one party a PTV of 6 or higher, there is no discernible VAA effect. Table 6 demonstrates that the differences observed between the ‘recommended’ and ‘not recommended’ groups when the recommended party has a PTV value of 8–10 are not replicated for this sub-population, confirming hypothesis 3.

Conclusions

In this article, we have looked at the effects of a very specific and increasingly compellingly political use of the Internet: VAA websites. Are the widely used VAA sites simply seen as ‘toys’ by their users? Or are they politically influential campaign actors which a large number of users consider seriously when deciding how to vote? If the former scenario were true, perhaps VAAs could be considered as being neither more nor less politically important than the millions of other websites that populate the Internet. However, given the findings presented in this article, it seems that VAA sites are politically

Table 6. Proportions of 'voted' user-party dyads for 'recommended' and 'not recommended' dyads for voters who gave a PTV of 6 or higher to one party only (*N* for each proportion in parentheses, statistically significant differences in boldface)

PTV	% 'voted' dyads recommended	% 'voted' dyads not recommended	% difference	Chi-squared test results
10	96.4% (54/56)	93.3% (31/33)	+3.1%	$\chi^2(1, N=161) = 0.66, p = 0.42$
9	90% (9/10)	93.9% (31/33)	-3.9%	$\chi^2(1, N=43) = 0.18, p = 0.67$
8	75% (6/8)	90.3% (28/31)	-15.3%	$\chi^2(1, N=39) = 1.33, p = 0.25$

relevant entities for at least some of their users, with both subjective and objective evidence demonstrating that a substantial proportion of our opt-in sample of kieskompas.nl users in the Dutch 2010 legislative elections took their online voting advice quite seriously when deciding how to vote.

If VAA websites are both widely consumed *and* substantively influential for user vote choice, then political scientists as a group should be closely involved in monitoring and improving the quality of VAA outputs. Political science as a field has much to contribute to the design and assessment of VAA sites: scrutinizing their placement of parties, their selection of statements and the algorithms that they use to compare voters and parties. Given the evidence presented here, there appears to be scope for a deliberately biased VAA to swing a number of voters to choose a particular party.

It is worth inserting some caveats about our findings. The survey analysed in this article does not benefit from the statistical and analytical advantages of being based on a randomized selection of site users. In order to maximize the number of participants, the option of signing up for future surveys and leaving an email address was made open to all users. In the event, 8,125 site users left viable emails and gave permission to be contacted post election, and just over 50 percent if these users completed our questionnaire. The site log file recorded over 800,000 unique visits during the campaign, so this self-selecting sample evidently represents a tiny proportion of the population of site users who were not randomly selected. These limitations of our data make it impossible to extrapolate from our findings to the Dutch electorate as a whole with confidence, and we therefore do not attempt to do so here. Future research on the topic of VAA effects should seek to overcome these limitations by combining the quasi-experimental approach detailed in this article with randomized sampling methods. There also remains considerable scope for experimental research on the influence of site design and site credibility on the effects exerted by VAAs on their users. Furthermore, we have to take account of the adaptive capacities of VAA designers, who may choose in future to redesign the 'advice' elements of their sites, which are typically designed with citizen education, rather than citizen persuasion as their goal. While this may suppress the active influence of current and future VAA sites on vote choice, our findings with the site studied in this experiment show that the effect could also be substantial, warranting close academic scrutiny of future VAA's.

We hope, however, that this research has demonstrated that there is evidence for the existence of a causal VAA 'effect' on user vote choice. Secondly, and more importantly,

we have tried to describe the *nature* of this effect. The explanation of how we investigated VAA effects provided in this article will help researchers interested in VAA effects to see if they are similar in other electoral contexts. Ultimately, the findings reported in this article are relatively straightforward – it appears that our survey respondents were influenced by the automated advice that they received on *kieskompas.nl*. Yet, voters generally did not follow the site's advice when the recommended party was not seen as a contender for their vote (as indicated by a low PTV score) before the advice was received. Being advised by a VAA to vote for a party which was already seriously considered appears to crystallize that pre-existing preference, making it demonstrably more likely that the site user will go on to vote for the recommended party. Incongruent advice appears to be, for the most part, disregarded by site users when they vote, and voters who are firmly set on voting for a certain party do not appear to be influenced by the advice that they receive.

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Notes

1. Walgrave et al. (2008) report an expert survey of European political scientists revealing that such sites had featured in national elections in 18 European countries. Thus far, VAA sites have been most prominent in European elections which feature fragmented multiparty competition (Hooghe and Teepe, 2007; Walgrave et al., 2008). However, there is also evidence of diffusion beyond fragmented systems; for instance, the US Presidential campaign in 2008 featured an Electoral Compass VAA website, and the Canadian Vote Compass VAA site attracted over two million unique visits in the 2011 legislative campaign according to the site's log files.
2. These investigations have cast some doubt over the accuracy of VAA sites' predictions regarding how users should vote, which tend to diverge dramatically from national electoral outcomes and the individual vote intentions of users (Walgrave et al., 2009; Wall et al., 2009) as well as demonstrating that the aggregate recommendations issued by VAA sites are sensitive to the selection of 'issue statements' that users are compared to parties over (Walgrave et al., 2009).
3. In terms of user demographics, analyses have consistently shown that VAA users are more male, more urban and more educated than national populations as a whole (Hooghe and Teepe, 2007; Ruusuvirta and Rosema, 2009; Wall et al., 2009). However, there are indications that the gap between VAA users and the rest of the population is narrowing over time (Fivaz and Schwartz, 2007).
4. For promising research on these topics, which indicates that VAA site use can increase both turnout and political engagement among users, see Marschall and Schmidt (2010); Ruusuvirta and Rosema (2009).
5. However, this optimistic interpretation has been challenged by those who believe that candidates, parties and media actively distort the heuristic signals received by voters, persuading

- them to vote differently than they may have done with complete information (*inter alia* Bartels, 1996; Lau and Redlawsk, 2001; Vavreck, 2001).
6. Ruusuvirta and Rosema's analysis is particularly insightful; they argue that the content of the advice (confirming or disconfirming existing preferences) has to be considered in investigating VAA effects, and they find that those who reported receiving preference-disconfirming advice when they used a VAA were nearly three times more likely to switch vote intention during the campaign than those who received preference-confirming advice.
 7. It is possible, of course, that the users visited the site before or after the visit where they left their email address (i.e. the visit for which their log-file was recorded). This may mean that our user 'error' figures are slightly inflated. Nonetheless, absent any other evidence, the proclivity of users to 'recall' their advice being the party for whom they voted when their visit records indicate that this was not the case, poses a significant methodological problem for user recall-based VAA studies. A further possibility is that the design of the kieskompas.nl output (see Figure 1), where users are shown a spatial representation of all parties, means that kieskompas.nl users may be more likely to be mistaken about their feedback than users of other sites, which typically list parties vertically in order of 'match'.
 8. The post-election survey also asked users to recall the advice that they received, which enabled us to analyse recall data for accuracy and bias in section 2 (Estimating the effects of VAA websites on vote choice).
 9. We use this value as a cut-off point indicator that a voter is seriously considering a party following the approach developed by van der Eijk et al. (2006: 432–439).
 10. For this part of our analysis, the dataset has been 'stacked' on the Vote, Advice and PTV variables. This means that we restructured the dataset so that each user-party relationship of interest is considered as an observation in its own right, occupying a row in the data structure. With 11 parties being considered, each individual respondent is therefore represented as 11 'observations' in the data. The advantage of this approach is that it allows us to consider the relationships between variables such as 'Advice', 'PTV' and 'Vote' across all parties in a single analysis, rather than having to analyse each relationship over all 11 parties. In the conventional 'wide' dataset structure, which we used to produce Tables 1 and 2 and Figure 2, each respondent is considered as a single observation, denoted by their occupation of a single row in the dataset with separate columns capturing the relationship between that respondent and each party. See van der Eijk et al. (2006) for details on the stacking procedure.
 11. Respondents who did not rate one of the parties on the PTV survey item, who did not vote, who did not recall their vote, or who reported a vote for 'Other' were dropped from this part of our analysis.

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